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EXAMINER

KIBLER, VIRGINIA M

ART UNIT

PAPER NUMBER

2623

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3

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/633,330

Applicant(s)

CAULFIELD, H. JOHN

Examiner

Virginia M Kibler

Art Unit

2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☒ Claim(s) 3 and 7-15 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 August 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because it exceeds 150 words.

Correction is required. See MPEP § 608.01(b).

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Claim Objections

2. Claims 3, 7-15 are objected to because of the following informalities: "(a)" should be changed to "(c)" in claim 3, line 1; "class ," should be changed to "class," in claim 7, line 10; "beam." should be changed to "beam," in claim 11, line 5; and "misclassified" should be changed to "misclassified" in claim 15, line 4. Appropriate correction is required.

Claims 8-10 depend on claim 7, and are therefore objected.

Claims 12-14 depend on claim 11, and are therefore objected.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3, 4, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Errico et al. (5,796,924) in view of Lyon et al. (5,903,884).

Regarding claim 1, Errico et al. ("Errico") discloses a process for training a pattern recognition system including providing a training set of objects each classified in two or more classes (Figures 4 and 5; Col. 4, lines 44-52; Col. 6, lines 18-24), taking data from each of the objects (Col. 1, lines 46-61), selecting a first discriminant space and computing discriminant values from the data, (Col. 4, lines 53-67 and Col. 5, lines 1-40) plotting the values in the discriminant space (Figure 4), establishing a decision boundary associated with the discriminant space, setting the decision boundary and applying a decision rule wherein at least one object in the training set is separated and correctly classified (Col. 6, lines 18-35), storing the first discriminant space, corresponding boundary and decision rule (Col. 7, lines 46-51), and repeating the above steps (Col. 6, lines 36-45). Errico discloses modifying the first decision boundary to a refined decision boundary that correctly classifies the overlapping objects (Figure 5). Errico does not appear to recognize removing the correctly classified objects from the training set, thereby creating a remaining set of objects. However, Lyon et al. ("Lyon") teaches that it is known to remove the correctly classified objects and repeat training with the remaining (Col. 2, 31-37). Therefore, it would have been an obvious to one of ordinary skill in the

Art Unit: 2623

art at the time of the invention to have modified the iterative process disclosed by Errico to include repeating without the correctly classified objects as taught by Lyon because there is little advantage to be gained by further training on a correctly classified object and removing the correctly classified would save time and prevent overtraining (Col. 4, lines 17-23).

Regarding claim 3, Errico discloses selecting a different discriminant space (Col. 4, lines 44-52).

Regarding claim 4, Errico discloses training on the overlapping objects until a number is reached (Col. 4, lines 10-26).

Regarding claim 15, Errico discloses accumulating objects misclassified by the existing system (Figure 4; Col. 6, lines 25-35) and using these and applying the training process in order to re-classify (Figure 5; Col. 6, lines 36-45).

5. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Errico et al. (5,796,924) and Lyon et al. (5,903,884) as applied to claim 1 above, and further in view of Akiyama et al. (5,602,938).

Regarding claim 2, Errico discloses defining a range of positions of the decision boundary from a first location, that properly classifies all objects of one class, to a second location that properly classifies all objects of a second class, and positioning the decision boundary at any point from the first to the second locations (Figures 4 and 5; Col. 4, lines 27-32). Errico does not appear to recognize the distance or margin between the two classes being maximized or minimized. However, Akiyama et al. ("Akiyama") teaches that it is known to maximize the distance between two classes (Col. 2, lines 5-14).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the

Art Unit: 2623

invention to have modified the distance between classes disclosed by Errico and Lyon to include maximizing the distances between classes as taught by Akiyama because it increases the accuracy of recognition by emphasizing the differences of each class (Col. 2, lines 5-14).

6. Claims 5, 6, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Errico et al. (5,796,924) in view of Lyon et al. (5,903,884) as applied to claim 1 above, and further in view of Straforini et al. (6,092,059).

Regarding claim 5, the arguments analogous to those presented above for claim 1 are applicable to claim 5. Errico and Lyon do not appear to recognize applying the discriminant space, decision boundary, and decision rule to a diminishing set of unclassified objects. However, Straforini et al. ("Straforini") teaches that it is known to sequentially retrieve the next rule-based classifier to a set of diminishing unclassified objects (Figure 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the stored discriminant spaces, decision boundaries, and decision rules disclosed by Errico and Lyon to include sequentially applying further classification to the diminishing set of unclassified objects as taught by Straforini because it allows for a more refined classification of the objects in order to increase accuracy of the system.

Regarding claim 6, Straforini discloses repeating until the stored rule-based classifications are exhausted (Figure 3).

Regarding claim 16, the arguments analogous to those presented above for claim 5 are applicable to claim 16.

Art Unit: 2623

7. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Errico et al. (5,796,924), Lyon et al. (5,903,884), and Straforini et al. (6,092,059) as applied to claim 16 above, and further in view of Akiyama et al. (5,602,938).

Regarding claim 17, Errico discloses defining a range of positions of the decision boundary from a first location, that properly classifies all objects of one class, to a second location that properly classifies all objects of a second class, and positioning the decision boundary at any point from the first to the second locations (Figures 4 and 5; Col. 4, lines 27-32). Errico does not appear to recognize the distance or margin between the two classes being maximized or minimized. However, Akiyama et al. ("Akiyama") teaches that it is known to maximize the distance between two classes (Col. 2, lines 5-14).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the distance between classes disclosed by Errico, Lyon, and Straforini to include maximizing the distances between classes as taught by Akiyama because it increases the accuracy of recognition by emphasizing the differences of each class (Col. 2, lines 5-14).

8. Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Errico et al. (5,796,924) in view of Lyon et al. (5,903,884) as applied to claim 1 above, and further in view of Watanabe et al. (5,754,681).

Regarding claim 7, the arguments analogous to those presented above for claim 1 are applicable to claim 7. Errico and Lyon do not appear to recognize applying all in parallel. However, Watanabe et al. ("Watanabe") teaches that it is known to apply the discriminant functions for each class in parallel (Figure 1; Col. 7, lines 66-67, Col. 8, lines 1-12). Therefore, it would have been obvious to one of ordinary skill in the art at

Art Unit: 2623

the time of the invention to have modified the discriminant functions for each class as disclosed by Akiyama to include applying all in parallel as taught by Watanabe because it shortens the processing time required to classify an object and thereby increases efficiency.

Regarding claim 8, Errico discloses combining groups of all objects of at least one class (Col. 3, lines 28-37).

Regarding claim 9, Errico discloses the step of applying classifies a portion of one class from the unclassified objects (Figure 5).

Regarding claim 10, Errico, Lyon, and Watanabe do not appear to recognize using a fuzzy determination of the likelihood of the object being within a class. However, the use of fuzzy logic is well known in the art and it would have been an obvious matter of design choice to use fuzzy logic because it allows for a more relax classification of the objects and is used to accommodate uncertainty.

9. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ginsburg (3,993,976), in view of Filipski (4,975,975).

Regarding claim 11, Ginsburg discloses modulating a coherent light beam by each of the patterns (Col. 4, lines 56-61; Col. 2, lines 34-42), optical Fourier transforming the modulated coherent light beam (Col. 4, lines 61-67), filtering 14 the Fourier transformed beam thereby providing a masked output, optical Fourier inverse transforming 20 of the masked output, thereby forming an optical signal positioned in a plane that corresponds to the corresponding positions in the x,y plane (Col. 4, lines 27-31), sensing the optical output, applying a threshold to the sensed optical outputs 22 (Col. 6, lines 45-54) thereby determining the x,y positions of the sensed optical signals that exceed the threshold.

Art Unit: 2623

Ginsburg does not appear to recognize the set of patterns being known to be in two or more classes or removing those patterns from the remainder of the training set. However, Filipski teaches that it is known for the set of patterns to be in two or more classes (Figure 16) and to remove the classified patterns from the training set and repeat the training process on the remainder (Abstract, lines 5-16), thereby training the system. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the process disclosed by Ginsburg to include training on patterns known to be in two or more classes and recursive training as taught by Filipski because it provides a pattern recognition system with increased accuracy.

Regarding claim 12, the arguments analogous to those presented above for claim 11 are applicable to claim 12. Ginsburg discloses introducing unclassified patterns and retrieving the stored masks 14 (Abstract).

10. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ginsburg (3,993,976) in view of Filipski (4,975,975) as applied to claim 11 above, and further in view of Watanabe et al. (5,754,681).

Regarding claim 13, Ginsburg and Filipski disclose applying the classification in succession rather than in parallel. However, Watanabe teaches that it is known to apply the classification in parallel (Figure 2) wherein each application provides an output classified grouping (Col. 8, lines 7-12). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the successive classification disclosed by Ginsburg and Filipski to include applying all in parallel as taught by Watanabe because it shortens the processing time required to classify an object and thereby increases efficiency.

Art Unit: 2623

Regarding claim 14, Filipski discloses producing the logical determination that all of one class has been separated from the unclassified objects (Col. 7, lines 26-43).

Other Prior Arts Cited

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Pat. No. 5,649,070 to Connell et al. for learning system with prototype replacement;

U.S. Pat. No. 5,966,460 to Porter, III et al. for on-line learning for neural net-based character recognition systems; and

U.S. Pat. No. 6,513,025 to Rosen for multistage machine learning process.

Contact Information

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Virginia M Kibler whose telephone number is (703) 306-4072. The examiner can normally be reached on Mon-Thurs 8:00 - 5:30 and every other Friday.

Art Unit: 2623

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.



VK
9/24/03

MEHRDAD DASTOURI
PRIMARY EXAMINER

